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ABSTRACT

The author reviews cross-sectional and longitudinal studies on the status of intelligence in the aging, and finds conflicting conclusions: (1) intelligence does decline as persons grow older; (2) only some aspects decline while others improve; and (3) intelligence does not decline. Certain factors are adduced to suggest that such argument-counterargument may characterize the research in the future, though there are signs that research designs may be refined. It is argued that research must focus on improved descriptions of the abilities which constitute the essence of intelligence in the most active years of adulthood and it is suggested that some of these abilities will indicate a form of independent, creative thinking that is not well-assessed by existing tests designed for youth. Two more fruitful trends are discussed which follow from efforts to rethink the idea that time is not a cause and that age is a dependent, rather than an independent, variable. (TL)

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Research on Intellectual Development: Retrospect and Prospects

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For me to be commenting on the issues of this symposium is rather like Mickey Mouse playing Hamlet: I may be able to mouth some of the correct words, but there is no way I can capture the essential character of the part I have been assigned to play. There are so many others, more experienced and wiser, who could do the needed retrospecting and prospecting about ontogenetic research. Need I add that I am wondering how in the devil I let myself in for this assignment? I'd like to run, but it's too late. So I'll have to bluff. There is one consolation, however: I needn't bluff for long. We can keep this part of the program mercifully short.

But let me see if I can raise a few points to arouse your curiosity or force you to think.

The first question we are called upon to consider is of the form: Where are we now, in this year of 1971, in our understanding of the development of abilities in adulthood? What do we know or think that we know? To try to make a point in regards to this kind of question I'm going to ask you to quickly retrace some of the larger steps in research which have brought us to where we are now. Thus recall, if you will, events such as Doll's highly controversial findings in 1919 concerning the peak of intellectual development: the growth of intelligence, he said, is practically complete by age 13. And recall the amplification and modulation of this message in studies which followed: the Yerkes (1921) reports, based upon over one million men tested in World War I. and the subsequent cross-sectional findings extend-

ing from the 1920's with the work of Jones, Conrad and Horn (1928) and Willoughby (1927), through the 1930's and 1940's in the reports of Jones and Conrad (1933), Kirihara (1934), Gilbert (1941), Wechsler (1944) and Vernon (1947), into the 1950's where the emphasis shifted from concern with intelligence, per se, to investigations of the age curves for subtests of the Wechsler scales, as in the work of Corsini and Fassett (1953) and Riegal (1958); and finally into the 1960's, where the shift then was toward examination of age trends for separate factors of intelligence, as in the work pioneered by Schaie, Rozenthal and Perlman (1953) and carried forth by investigators such as Horn and Cattell (1966). Recall, too, the discussions generated in the 1950's by the longitudinal studies of Owens (1953), Bayley and Oden (1955) and Jones (1958), and the further controversy in the 1960's occasioned by Schaie's (1965) presentation of a tri-component model, Baltes (1968) evaluation of this model and the applications of the model in studies such as those reported by Schaie and Strother (1968), Baltes and Reinert (1969) and Schaie (1970).

You know the general features of this work. What kinds of conclusions and other reactions does it arouse in you? Let me prompt your reminiscense on this theme by suggesting that the research makes you a bit uncomfortable and that one reason for your discomfort is that the work has a two-faced quality which gives you a faint feeling of being a party to duplicity. For on the one hand there has been a preoccupation with describing deficits which accompany aging, it then usually being implied (perhaps subtly) that the deficits indicate an intrinsic,

inevitable aspect of the process of growing old. On the other hand, at least in this country, where the ideology of youth has reigned supreme, there have been efforts to either ignore the findings on decline, to regard them as mildly disrespectful, to rationalize them or to find other ways to soften the blow which the findings deliver. For the sneaky message that keeps coming through in the results to which I have referred is that as we become wealthier and more powerful--which we do as we get older--we also become dumber; that as we become more and more responsible to larger and larger numbers of persons for decisions having greater and greater impact and calling for ever-increasing amounts of creative, powerful thinking, we also (so our results whisper) become less capable of providing the demanded, propitious solutions.

Looking back, then, on the evidence accumulated from some 50 years of research on human abilities and aging in adulthood, the suggestion is that our scientific curiosities first drive us to find results which derogate us, but then this prompts us to find other results, and other explanations for results, to bolster our weakened self-esteems. So it is that the findings from the first studies in this area suggested an early peak and subsequent decline in intelligence, but then investigators looked for, and found some aspect of intelligence that didn't decline: the early studies indicating aging loss of intelligence were followed by studies showing that vocabulary, or what was called verbal IQ, did not decline. In some of the more recent expressions of this theme the evidence for adulthood losses in the reasoning-

abstracting aspects of intelligence, has been countered with results suggesting that whereas fluid intelligence declines from a peak near age 20, crystallized intelligence either doesn't decline or else improves in adulthood (Horn, 1970; Horn and Cattell, 1967). Such is the story rendered by cross-sectional research. But the story told by longitudinal investigations has a similar plot. Here it is suggested that whereas the average scores for samples of older persons may be lower than the corresponding averages for younger persons when both kinds of samples are collected at a given point in time, this does not mean that there has been loss of intelligence within the persons who score lower, but only that earlier generations were less well-stimulated by the factors which influence test performance than were the later generations. This is also the essence of the counter-argument supplied by the recentwork stemming from Schaie's (1965; 1970) proposals for more refined analyses of age-related data. The analytic teasing out of cohort, time and age effects in studies such as those of Schaie (1970) and Schaie and Strother (1968) ends with the comforting thought that the dismal messages conveyed by cross-sectional findings mainly represent lesser educational input into earlier as compared to later generations.

The flux and reflux to which I refer here is also illustrated in the lesser streams of research on aging and human abilities. Consider, for example, the selection effect which is sometimes mentioned in longitudinal research; that is, the effect indicated by findings (Owens, 1953; 1966; Hilton and Patrick, 1969) showing that individuals who are found for samples of older persons tend

to be more able, as judged by scores on tests given initially, than the persons who are not found and thus drop out of the samples of older subjects. This tends to detract from findings suggesting no decline or improvement in intelligence. But not infrequently when this selection effect is recognized, it is for the purpose of introducing the idea that loss of intelligence does not occur in some people--namely people of the kind who investigate age differences in intelligence. That is, observations on the selection effect are used to support the theory that whereas there may be intellectual decline with age in those who are not very intelligent, this decline either does not occur, or is slight or occurs very late in those of high intelligence. And, of course, it is only a small step in logic to equate those of high intelligence with psychologists or others who do research on aging.

Several kinds of arguments based on statistical reasoning have a similar flavor. Thus, for example, I have rationalized cross-sectional results on fluid intelligence (Horn and Cattell, 1967) by suggesting that perhaps only a few people experience decline, the probability of which, however, increases with age. This recognizes the comforting possibility that you and I have not declined in intellectual ability, but some individuals in samples of persons our age have experienced notable loss and so when their scores are averaged with ours the resulting mean may well be lower than the mean for samples of younger persons in which there are relatively fewer individuals who would have suffered decline. This argument is similar to Baltes (1970) suggestion that decline in intelligence may occur primarily only

at a short terminal stage of life, the relative frequency of which stage increases with age. According to this reasoning the cross-sectional findings showing decline indicate only what people can expect when they get sick and ready to die; the results don't indicate loss of abilities during our active years when we are healthy, although old.

In recalling stories of these kinds we should also remember the stalwart efforts aimed at showing that the apparent loss of intelligence in adulthood is really only a decrease in the preferred rate of working on tests or a lessening in willed speed of performance. Similarly, we should not forget that throughout this history of research we have always had ready access to the idea that the tests don't measure intelligence anyhow, but only a kind of performance that is a not-too-relevant predictor of the truly important intellectual performances we display in "real life."

My point, then, is a simple one: when we produce results suggesting that we, or our peer group, is lacking in a much-valued attribute, we also generate powerful personal needs to discount these findings and these needs drive us to invent ever-more-ingenious procedures and researches for the purpose of demonstrating that we are, and our peer group is, really quite worthy.

Don't misunderstand me on this point. My intent is not to malign research and researchers in this area. I'll readily acknowledge that scientists are usually more objective than other persons and, indeed, are quite objective when assessed on an absolute scale. I'll grant, too, that psychologists who are

scientists are usually aware of how defense mechanisms operate--even in scientific matters. But is the objectivity and understanding which we are able to maintain in research on our own intelligence sufficient to deter the force of needs to preserve our sense of legitimacy? I think not and that, indeed, research on aging and intelligence is very much shaped by the very personal needs of researchers.

There are a number of rather interesting implications of this way of thinking. I'll leave you to pursue most of these on your own if you feel so inclined. I would mention only one in passing. This is the notion that if very old psychologists are unhappy with evidence suggesting that they or their peers are rapidly declining in intelligence, then probably they should stay in the fray of research and steadily bring forth results which will qualify the findings produced by younger investigators. In some respects the best people to study aging at a particular level are those who are at that level.

However, my major reason for bringing up this point is not to encourage older people to go into research on aging, but to suggest that the flux and reflux which we can see in previous research represent powerful influences which will shape the explorations of the future. Thus we can look forward to more studies which, in essence, indicate that adults get less intelligent as they get older and more studies, too, aimed at showing that adults get more intelligent as they get older.

But is this to be mainly only a replay of the same old pieces using more refined instruments of research or can we discern the outlines of some really new compositions? I think maybe

we can expect to find some new things in the offing. Let me see if I can outline a few of these.

First, it seems to me that one kind of development we might expect in the future may follow from attemps to apply some of the design refinements suggested by Schaie (1965; 1970) and Baltes (1968). For to the extent that these designs are feasible--and I am worried that they may be so cumbersome and difficult to apply that researchers will often leave them on the shelf--but to the extent that they are applied, they can force investigators to design their experiments to allow for more comprehensive description of the kinds of attributes which develop in adulthood.

It has been noted repeatedly--by such leaders in research on adulthood as Raymond Kuhlen (1959), for example--that tests designed to show what a clever child or adolescent can do may not be very appropriate to the task of describing the capacities of an intelligent adult. This point was made rather well and concretely, if unintentionally, by Banesh Hoffman (1964) in his little Phillipic entitled The Tyranny of Testing. Here was an obviously quite intelligent adult recognizing that if he were to truly exercise his intelligence in response to, for example, a number series problem which was mathematically indeterminant, he would not select any of the proffered answer choices and thus would fail to earn points that would be counted to indicate his intelligence. Yet such items are readily accepted by youths as having one of the answers given in the test, although youths may be most pleased to have adults such as Hoffman tell them that the test problems do not have truly correct answers. What is

illustrated here, I believe, is a belief that many of us have--namely, that a major part of the wisdom of adulthood is not simply accumulated learning, but a more advanced, independent, creative form of thinking than is accurately represented in the conformance-oriented tests which are used with youth and which, as a matter of fact, may very accurately represent how adaptively bright we are when we are young. Perhaps it helps to talk about this adulthood thinking in terms of developmental stages, as in a Piagetian theory, [1] but the more important suggestion is that we have not yet developed measuring instruments to assess what is recognized as intelligence in the years when people are no longer merely assimilating the culture, and in this sense accommodating to expectations laid down for youth, but are actively in the process of attempting to advance the culture or, at least, are in major decision-making roles throughout much of each day. That is, much of what is really intelligence in adulthood is **creative** thinking, although not necessarily the kind of creative thinking represented by the fluency tests used in research such as that of Getzels and Jackson (1961), Guilford (1967) or Torrence (1965), where, again, the emphasis is on the study of children

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1. Although one of the major advocates of this kind of theory, Flavell (1970), has argued that if such a stage is found at all in adulthood (and he doesn't give much credence to this idea), it will not be as clear-cut, or as consistent or as large as the stages that are said to exist in childhood development.

going to get the subjects we must have to provide the raw information. No amount of sophisticated analysis can make up for inadequate basic data.

On a more optimistic note, perhaps we can find a few other, more practical, current trends which promise to provide truly novel contributions to our thinking about adult intellectual development. One of these trends, it seems to me, is represented by conceptualizations, such as thoseof Wohlwill (1970), which emphasize the notion of treating the age variable as part of the dependent variable, rather than as an independent variable. If age is to be regarded a dependent variable, then clearly studies can be designed to show that one really is only as old as antecedent determinants say he is or, more colloquially, one really is only as old as he feels, as specified by antecedents. Such experiments can put scientific vigor into common-sense observations such as those indicating that some people are intellectually older, as well as perhaps physically older, at 40 years of age than are others at 60 or 70. Also, if age is to be regarded as a dependent variable, it becomes sensible to devise correlational studies to predict it and controlled-manipulative studies to account for it, thus suggesting power to control the forces of aging. We are doing some multiple correlation and discriminant function studies at Denver based upon this premise. If age is regarded as a dependent variable (or an integral part of the dependent variable which we can refer to as the developmental function), then perhaps we can look forward to some better definitions of the independent variables which affect this

variable. This means that research based upon this premise will be forced into efforts to more effectively describe the environment. Thus taxonomically oriented researchers will be pushed to do more studies on the structure and interrelationships among the influences which operate in adulthood, as exemplified in research already done by investigators such as Sells (1963), Bloom (1964), Moos (1968), Dogan and Rokkan (1969) and Lawton (1970). This in turn leads to interesting questions about the multiple interrelationships between multiple environmental dimensions and multiple performance dimensions, questions sketched in tantalizing outline in the writings of Nesselroade (1970), Baltes and Nesselroade (1970), and Baltes and Labouvie (1971). As Cattell (1950) emphasized many years ago in his dynamic crossroads theory of development, it is clear that the molecular antecedent variables studied within the context of traditional learning, perception and motivational theories will account primarily for only the short-period currents in development, not for the major flows and confluences which produce the broad patterns of personality which we use at a clinical level. Or as Baltes and Labouvie (1971) have more cautiously stated, . . .one wonders whether the principles developed in the framework of classical behaviorism, due to their largely univariate and molecular nature, might be ill-suited for organizing the antecedents involved in the ontogeny of such molar response systems as intelligence. The major point is that seemingly now, 20 years after Cattell's almost quixotic suggestion that we build multivariate, interactive and molar theories relating environment and behavior,

the pressures for understanding in life-span developmental psychology may force investigators to carry out studies which will produce this kind of theory within the coming decades. This, it seems to me, can give a new twist to studies designed to show that intelligence does and does not decline in the mid-years of adulthood.

A related course of study which we might expect to follow from efforts to re-think the idea that time is not a cause and age is not an independent variable is suggested by efforts to specify life phase descriptions of the societal variables which determine the roles and expectations of adults. The work of Hammond (1954), Gagne (1968) and Neugarten (1969) is suggestive in this regard. Hammond, for example, defined some seven major phases of life by reference to critical events which mark entry into the phase. In this kind of a system a man in one of the later phases of life might be defined not by a chronological age of 65 or older, say, but by such events as "retired from work," "has no regular responsibilities to produce," "draws old age benefits," whereas a man in an intermediate phase of typical adulthood might be designated as one who "either holds a job or is expected to hold one," "has children of school age," or, if you'll grant me a frivolous item, "is mortgaged up to his teeth." By this kind of definition of a developmental independent variable, Raymond Cattell, who is 66, could be regarded as in the same phase of life as am I at age 42. This may more accurately describe where the two of us are in terms of maintenance of intellectual

abilities (as well as in terms of attitudes and viewpoints) than to speak of our ages. At least it may provide a more accurate basis for description than that provided by the implicit argument that because we are separated by 24 year-units we are separated by a comparable number of units in intellectual development. Here I have picked an example where decline in the cross-sectional sense does not obtain and the suggestion is that such a finding need not be regarded as a contradiction of results indicating that decline does occur if it is recognized that development is related to phase of life, not chronological age. Granted that this kind of conceptualization is not as all-inclusive and comprehensive as one based upon treating age as an independent variable, still it may allow us to make sense out of the data we get in adult development studies.

Well, I promised you I would be brief, so let me sum up.

The suggestion is that we should clearly recognize the fact that our research on aging in adulthood is motivated in part by personal needs to defend the hypothesis that adults of the age of the researchers are, indeed, quite intelligent. We can expect, therefore, that some research in the coming years will be, as in the past, directed at neutralizing results indicating that there are deficits in adult intelligence. This may be referred to as defensive research. It is argued that research which will take the offensive in this battle will need to focus on improved description of the kinds of abilities which constitute the essence of intelligence in the most active years of adulthood and it is

suggested that some of these abilities will indicate a form of independent, creative thinking that is not well assessed by existing tests designed for youth. It is maintained, too, that this kind of improved description of adult intelligence must be done if applications of the Schaie-type analyses is to be more than merely refined splitting of hairs already identified by previous research. Finally, it is suggested that the current cultivation of the idea that age is a part of the dependent variable, not an independent variable, will blossom in studies which will help to indicate how aging can be predicted and controlled. This research will also be aimed at showing how development can be understood in terms of the massive collections of learning experiences and expectations which constitute major phases of life.

So much for crystal ball gazing.

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